TENSIONED PROTECTIVE FENCE WITH GATE AND METHOD OF INSTALLATION THEREOF

BACKGROUND OF THE INVENTION

In recent years, a need has been recognized for a type of swimming pool fence that is difficult for a small child to climb and is weather resistant, yet may be removed for uninterrupted use of the swimming pool. These fences employ a number of rigid or slightly flexible poles of steel, aluminum or fiberglass which are set in holes in a pool decking approximately two feet from the edge of the pool. The poles are located at approximately a 30-36 inch spacing.

Tensioned between the poles is a mesh screen having a binding top and bottom and sufficient tensile strength so that a person cannot easily enlarge the mesh openings to force a way through the fence. Further, there are no footholds or handholds for a child to climb the fence. The bound upper edge of the fence prevents fraying of the mesh, but does not provide a handhold or sufficient rigidity to aid a child to climb over the fence, even if the child can reach to the top of the fence. The instability of the top binding acts as a deterrent for the child even if he or she touches the top of the fence.

The fence may be opened to allow swimmers to enter and leave the pool area by unlatching a section which acts as a gate, usually with a spring-loaded hook and eye fastener and then by lifting one pole out of its deck socket. The pole must be reinserted and the latch hooked for each entry and departure from the pool area. More elaborate gates have also been developed.

When the pool is used without the fence, each of the poles may be pulled in sequence from their socket and the fabric fencing material and poles are rolled to form a compact structure. Reassembly of the fence starts by inserting the first pole, hooking it to a rigid structure and extending each pole in the section in sequence to another rigid structure or back to the original pole to complete a closed circuit. Each section is then tensioned with the fastener connecting each fence section to the next section.

Initially, holes were made in the pool decking that were at a diameter capable of receiving the lower end of the fence poles. This approach required holes large enough to receive the full width of a fence pole. However, in an effort to make the holes less noticeable when a pool is used without a fence, designs were developed where smaller diameter steel pins were mounted at the lower end of a fence pole such that smaller holes, capable of receiving the smaller diameter pins, could be placed in the pool decking. Such pins have not been used at the gate structure for pool fences because of a perceived need to provide a more stable, rigid structure at and near the gate.

The steel pins have been mounted in the fence poles by placing at least a portion of their length inside the center of a length of plastic pipe. The pin would extend out beyond one end of the plastic pipe. The entire length of plastic pipe would then be inserted into the lower end of a fence pole, with the outwardly extending portion of the steel pin extending from the lower end of the pole. The fence pole, plastic pipe and steel pin would then be held in place by a screw placed through a bore drilled across the fence pole, plastic pipe and steel pin from side to side of the pole.

As noted above, poles with smaller diameter pins have not been used at and near gate structures because of stability concerns. Moreover, attaching the pin to the pole using a cross screw is a difficult process; three components must be held steady during drilling of a cross hole and then placement of the screw to ensure that everything lines up. The resulting attachment is also subject to failure should the cross screw shear during any twisting of the three components relative to one another. Accordingly, a more stable and reliable fence pole with a smaller diameter pin at its lower end would be desirable, as would a lightweight fence incorporating such poles, including even at and near any gate structure.

SUMMARY OF THE INVENTION

The present invention, in one aspect, comprises a fence pole having a lower end, an insert that is received within the lower end of the fence pole and a pin that is adhesively attached to the insert, the pin having a diameter smaller than that of the pole and a portion that protrudes from the lower end of the fence pole. In another aspect, the present invention is directed to a method of manufacturing a fence pole comprising: coating a portion of a pin with an adhesive; introducing the pin into an insert, the pin protruding from the bottom of the insert, and placing the insert within the pole so that the pin protrudes from the bottom of the pole.

In yet another aspect, the present invention is directed to a lightweight fence and gate for swimming pools surrounded by a deck comprising a plurality of poles adapted to be inserted into the pool decking adjacent to the pool, the poles including an insert that is contained within each pole and a pin that is adhesively attached to each insert, the pin protruding from the bottom of each pole; a mesh screen tensioned between the poles having top and bottom bindings; a gate in the fence including a frame having a pair of spaced upright support members, a first horizontal brace for spacing the upright support members and a length of mesh screen tensioned between the upright support members; support means capable of withstanding lateral tension forces of the screen for supporting and latching the gate; hinges secured to the support means on one side of the gate; and a latch device secured to the gate and to the support means on the opposite side of the gate.

In a further aspect, the present invention involves the method for installing a self-closing gate in a tensioned removable swimming pool fence comprising a plurality of poles interconnected by flexible mesh fencing comprising: inserting a series of the plurality of poles into a deck surrounding a swimming pool with the flexible mesh fencing in tension to maintain the fence in tension; the first and last poles of the series of poles defining a gate opening, the poles including an insert that is contained within each pole and a pin that is attached to each insert, the pin protruding from the bottom of each pole; the first and last poles each constituting a pair of poles interconnected to each other to define a support structure capable of absorbing the tension of the flexible mesh fencing; fabricating a gate including a pair of side rails, a cross rail and flexible mesh tensioned between the side rails; hinging the first of the pair of side rails of the gate to the first of the pair of poles; and installing a latch between the second of the pair of side rails of the gate and the last pole of the tensioned fence; whereby the gate is free to open and close without interference by the tension of the mesh of the fencing.

One embodiment of the present invention includes a tension protective fence with a gate presenting the same overall appearance and degree of safety as the fence, but with superior accessibility for adults and difficult accessibility for those of lesser strength and dexterity, such as children.

That embodiment employs a tensioned pool fence with a multiple pole truss arrangement at each side of the intended gate opening. The multiple poles form a rigid truss. The poles may be arranged and canted sufficiently to provide free standing end posts defining a gate opening. Multiple poles adjacent to the gate relieve the gate from the tension present in the fence.

The gate, in a preferred embodiment, has a U-shaped frame with a bottom bar, side rails and angle bracing rods or gusset plates for reinforcement, and a fabric fence material matching the fence extending between the side rails. In this embodiment, there is no top bar so that the gate presents no easier access for a child than any other section of the fence.

The poles forming the truss, as well as the remaining fence poles, may be formed with smaller diameter pins extending down from the lower end of the poles. This embodiment would allow smaller holes in the pool decking. Moreover, in a preferred embodiment, the pins are metal and are mounted in the poles by being adhesively attached in plastic pipe that is then inserted in the poles.

One or more embodiments of the present invention may have one or more of the following features:

1. A tensioned pool protective fence with a tensioned fabric gate in a non-tensioned gate opening.

2. A gate design which provides few, if any, handholds or footholds for a child attempting to climb the fence.
3. A pool security gate with no top gate bar.
4. A gate openable only at the top of the gate post by a manually dexterous person.
5. Poles with smaller diameter pins extending from the lower end thereof for placement in smaller diameter holes in the pool deck.
6. Poles with smaller diameter metal pins adhesively mounted within plastic pipe inserted into the lower end of the poles.

BRIEF DESCRIPTION OF THE DRAWINGS

This invention may be more clearly understood with the following detailed description and by reference to the drawings in which:

FIG. 1 is a perspective view of a prior art fence and gate opening;

FIG. 2 is a perspective view of an embodiment of a fence installation incorporating two gates;

FIG. 3 is a front elevational view of an embodiment of a gate of this invention with a portion of a pool deck in section;

FIG. 3a is a cross-section of a preferred embodiment of the bottom portion of a pole, an insert and a pin;

FIG. 4 is a top sectional view of an embodiment of a gate region of the fence of FIG. 3 taken along line 4--4 of FIG. 3;

FIG. 5 is a fragmentary sectional view of a hinged side of a base of the gate of FIG. 3;

FIG. 6 is an exploded view of a latch assembly of FIG. 3;

FIG. 7 is a perspective view of a hinge of FIG. 3;

FIG. 7A is a top plan view of the hinge of FIG. 3;

FIG. 7B is a front elevational view of a hinge assembly of FIG. 3 showing an interior spring;

FIG. 8 is a force diagram of a gate post assembly of FIG. 3;

FIG. 9 is a force diagram of a gate of FIG. 3;

FIG. 10 is a perspective view of the gate latch assembly of FIG. 3 in a closed and locked position;

FIG. 11 is a perspective view of a gate latch assembly of FIG. 3 in an open and unlocked position; and

FIG. 12 is a side elevational view of a gate latch of FIG. 3 in a latched position.

DETAILED DESCRIPTION

FIG. 1 is representative of a prior art tensioned pool fence 100 including particularly the gate region 102 after a hook and eye closure 16 has been opened. The fence poles 18 and 19 are slightly bowed outward because of the tension on each section of the fence.

The fact that the entire fence is tensioned when it is closed allows the poles to be relatively small in diameter, e.g., they may have an outer diameter of about 1". The poles may be manufactured of steel, aluminum, fiberglass tubing or any other suitable material. However, tensioning the fence makes opening of a section or installation of a gate as described above incompatible with normal fence integrity. Moreover operation of a gate places additional forces and stresses upon the poles at and near any gate.

In order to open the "gate," pole 19 may be lifted upward out of its socket 17 in the pool deck 70 while pole 18 will be kept in place. Pole 19 will then be folded back to allow entrance and departure from the pool area.

In order to open the gate portion of the tensioned fence 100, a person must draw the poles 18 and 19 together sufficiently to relax the load on the hook closure 14 and release it. Then, in opposition to the pool fence tension, the person must draw the pool pole 19 out of its socket 30 in the pool deck 70. Individuals with limited strength or manipulative ability have difficulty with these two steps. As shown in FIG. 1, the first step of releasing the hook 14 and eye closure 16 has been completed. To close the gate, the steps are reversed.

Now referring to FIG. 2, an entire pool fence 10 is shown with two gates. The tension fence 10 may be made up principally of poles 11 and a vinyl-coated mesh fabric 72. The fence 10 has a lower binding 12 and an upper binding 13 and is installed with between about 15-20 lbs of tension uniformly from top to bottom around its entire periphery. The top and bottom bindings 12 and 13 do not provide effective footholds or handholds to allow a child to climb the fence.

Referring to FIG. 3a, the fence poles 11 may have an insert or pipe 93 lining a portion of the pole 11. The insert can be made of plastic or another lightweight material. In a preferred embodiment, the insert 93 is about 24 inches long, extends upwardly from the bottom of the pole and is made from Schedule 80 polyvinylchloride (PVC). The insert 93 may be attached to the pole 11 by screws (not shown) that also secure the fabric 72 of the fence 10 to the poles 11. The insert 93 may also be attached to the poles 11 through the use of rivets or other suitable mechanical means. Moreover, as part of the present invention, it has been determined that adhesives may be used to reliably attach pole components to one another. Thus adhesives could be used to attach the insert to the pole. Further, the insert may be made from any lightweight durable material.

Attached to the bottom portion of the insert 93 may be a pin 91. In a preferred embodiment, part of the pin extends past the bottom of the insert 93 and pole 11. In a further preferred embodiment, the pin 91 is made from a metal, such as stainless steel, is about 11 inches long and extends about 4 inches past the bottom of the insert 93 and pole 11. The pin 91 may be attached to the insert 93 by adhesive, or by any other suitable attachment means. An appropriate adhesive should provide a sturdy bond that is relatively unaffected by exposure to ultraviolet light and by changes in temperature. It is anticipated that appropriate adhesives could be selected from epoxy, acrylic and urethane adhesives.

The pin 91 and insert 93 assembly of this preferred embodiment is advantageous because it is easier to manufacture and because it is more cost effective. The bond created by the adhesive between the pin 91 and the insert 93 holds the two pieces together, thus eliminating the need to drill a bore through the fence pole, the plastic pipe and the steel pin. Further, the cost of the adhesive, and the time spent assembling the pin 91 and the insert 93 is less than the cost of a screw, and the time spent drilling a bore through the assembly, and inserting a screw therethrough.

In order to set up the fence, the insert 93 of the fence poles 11 is guided into a socket 30 that may be drilled into a base surface, for example, a pool deck 70. The combination of the insert 93 and the pin 91 adds to the stability and structural integrity of the poles 11. Thus, in a preferred embodiment, the poles 11 of the fence 10 are made of aluminum. Due to the light weight of aluminum poles, they are easier to carry and set up than, for instance, galvanized steel poles.

In one embodiment of the present invention, the openings in the fence 10 are of sufficient size to provide a clear view through the fence to observe the pool condition, but are small enough to prevent a child from placing his or her fingers or toes into the fence. Preferably, the openings in the fence 10 are smaller than about 1/4 inch in diameter.

An embodiment of a gate 15 of the present invention is shown in FIG. 3. A first pair of support poles 20, 22 may line one side of the gate 15. The poles 20, 22 may be inserted into individual sockets 30 that serve to keep the poles 20, 22 substantially vertical. The support poles described herein with respect to the gate 15 are similar to the poles described above with respect to the fence 10. The first support pole 20 may be connected to the second support pole 22 by any appropriate means to form a vertical truss. The spacing between the poles is not critical as long as the poles are connected to form a suitable truss. In a preferred embodiment of the invention, the poles are connected by cross-members 24 and 26. A second pair of support poles 21 and 23, also inserted into sockets 30, may line the other side of the gate 15. The support poles 21, 23, in a preferred embodiment, may be connected by cross-members 25, 27 to form a second vertical

truss. In an alternate embodiment, poles 11 with a pin 91 extending from the bottom may be used. In this embodiment, the pin 91 is inserted into sockets (not shown) that may be a smaller diameter than those used for the poles 11. The sockets 30 may be drilled at an angle toward the gate which allows the fence to stay in tension when fabric 72 is attached to the poles 11 which are inserted into the sockets 30. Preferably, the sockets 30 are drilled at an angle of about five degrees toward the gate. The depth to which the sockets are drilled is not critical, but it should be deep enough to allow the poles to support the fence in tension.

As shown in FIG. 3, the dual poles 20, 22 and 21, 23 located on either side of the gate isolate the gate 15 from fence tension. The dual truss poles 20, 22 and 21, 23 may remain essentially vertical when subject to the unidirectional fabric load of the fence.

Further referring to FIG. 3, in connection with FIGS. 4 and 5, preferably the gate 15 comprises three frame members. These members include a hinged upright member 31, base member 32 and a latched upright 33. Preferably, the base 32 and uprights 31 and 33 are made of steel or aluminum tubing. However, the frame members may be made from any suitably rigid material. The base 32 may be attached to the uprights 31 and 33 by screws or other appropriate attachment means. Reinforcing angled rods or gusset plates 35, 36 may be welded or brazed at the joints between the base member 32 and the uprights 31 and 33 to form a unitary structure. A cross-brace 37 may be attached to upright members 31, 33 for additional support. In a preferred embodiment, the cross-brace 37 is on the pool side of the gate 15 which ensures that it does not present a foothold on the non-pool side of the gate 15. Tensioned between the uprights may be a section of improved fencing material 72 with edge bindings 12 and 13 similar to the fence material.

To provide uniformity of appearance and freedom from any rigid top cross bar structure on the gate, a U-shaped gate may be employed in a preferred embodiment of the present invention as shown in FIG. 3. However, it will be obvious to those skilled in the art that many modifications may be made to the gate shape that will achieve an acceptable gate structure. Thus, the specific shape of the gate is not critical. It may even include a rigid top cross bar structure in circumstances where child proofing is not an issue.

The gate may have two sides, a hinged side and a latched side. On the hinged side, the upright member 31 may be pivotally connected to the first pair of support poles 20, 22. In a preferred embodiment, corrosion resistant hinges 74, as shown in FIGS. 7, 7a and 7B, spring mount the upright member 31 to the adjacent pole 22. The hinges 74 have internal springs 45 (FIG. 7b) which urge the gate 15 to a closed position.

The latched side of the gate 15 may include a smooth-surfaced latch member 50 secured to pole 21 as shown in FIGS. 6 and 10-12 and a gate latch assembly 53 carrying a magnet 56 on

the upright adjacent gate pole 33 as shown in FIG. 4. The latch member 50 may include a tube 51 containing a ferromagnetic bar 52. The ferromagnetic bar 52 within the tube 51 may extend along a substantial length of the tube 51 to provide a latching element for the magnet 56. The magnet 56 urges the bar 52 toward its socket and, in a preferred embodiment, is of sufficient strength so that it will draw the gate 15 closed whenever the gate 15 is open between about one to two inches. Brackets 81 and 82 may be used to secure the latch assembly to the upright support pole 21. Further, brackets 87 and 88 may be used to secure the magnet 56 and its housing to the gate upright 33. However, the latch assembly 53 and the magnet 56 and its housing may be attached to their respective poles, 21 and 33, by any appropriate attachment means.

The top of the magnetic latch 50 may include a button type handle 60 and a key lock. The gate 15 may be opened by a person by lifting handle 60 to disengage the rod 52 from the socket of magnet 56 and also may be mechanically locked in the closed position by key 90.

The fence may be set up as follows. Flexible mesh fencing 72 may be attached to a plurality of poles at selected intervals. The length of the intervals is not critical, but they should be at such as distance to keep the flexible mesh in tension around the pool or spa which the fence 10 surrounds. The poles may be secured to a deck 70 or any other structure surrounding the pool or spa. Two pair of poles 20, 22 and 21, 23 may then be secured together to form a tension absorbing support structure, one at each edge of a gate in the fence 10. The gate may include a pair of side rails 31 and 33 and a cross rail 32, and tensioned mesh 72 extending between the side rails 31 and 33. One gate side rail 31 may be pivotally connected to the first of the pairs of poles, 20, 22, defining the gate opening. The second of the pair of side rails 33 of the gate may be releasably connected to one of the second pair of poles 21, 23 defining the gate opening.

The above described embodiments of the present invention are merely descriptive of its principles and are not to be considered limiting. The scope of the present invention instead shall be determined from the scope of the following claims including their equivalents.